OH COLUMN ABUNDANCE OVER JPL'S TMF 1997 - 2000

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Abstract

The column abundance of OH over the Jet Propulsion Laboratory's Table Mountain Facility (TMF) has been measured regularly since Jul 1997 using the Fourier-Transform Ultraviolet Spectrometer. 4574 measurements have been made at solar zenith angles of 11 - 80 degrees since Jul 1997. Of these, 1600 morning measurements and 1535 afternoon measurements were made between Nov 1998 and Dec 2000 at solar zenith angles =< 65 degrees and have fractional spectral fit uncertainties of =< 37%, with a median uncertainty of 14%. Empirical linear fits for OH column as a function of solar zenith angle have been derived. The afternoon OH column typically is larger than the morning OH column at the same solar zenith angle. After removing the first-order dependence of OH column on solar zenith angle, daily average variations in OH column over TMF were calculated. The variations observed are statistically significant, are highly correlated between morning and afternoon, and are highly correlated at all solar zenith angles ~< 60 degrees. The observed daily average variations in OH column are most strongly correlated with variations in ozone and water vapor abundances at 35 - 45 km altitude as observed near TMF by HALOE (version 19). This qualitatively agrees with sensitivity studies made using a photochemical model with standard JPL97 chemistry. Estimated variations in OH column predicted from a linearized sensitivity analysis and the observed variations in water vapor and ozone have a correlation coefficient of 0.47 when compared to the observed variations in the OH column. The slope of the linear fit for OH column as a function of solar zenith angle is steepest in winter and shallowest in summer. This may result from the observed decrease in the ozone column above 40 km altitude and the observed increase in the water vapor mixing ratio at 40 - 50 km altitude in winter over TMF. The annual average OH column observed over TMF is larger than that reported over Tokyo by Iwagami et al. [1998] and smaller than that reported over Colorado [Burnett et al. 1989; Canty et al. 2000] and New Mexico [Canty et al. 2000].

This research was performed at the Jet Propulsion Laboratory, California Institute of Technology, and jointly sponsored by Caltech and the National Aeronautics and Space Administration.

First topic: 3- Trends of species of relevance to stratospheric chemistry
Second topic: 5- Impact of stratospheric change on surface UV radiation and the climate